FACT SHEET FOR NPDES
PERMIT NO. WA-002337-0

TOWN OF TWISP
PUBLICLY OWNED TREATMENT WORKS
P.O. BOX 278
TWISP, WASHINGTON 98856

SUMMARY

The Town is located in western Okanogan County along State Highway 20 in the central Methow Valley and approximately 30 miles west of the City of Okanogan. The area is principally residential with tourism and timber activities.

The existing POTW is an activated sludge, extended aeration, oxidation ditch design, which provides secondary treatment for the Town's wastewater. The POTW is classified as a Class 2 facility due to its component parts and complexity of operations. The existing POTW continues to produce high quality effluent that earned it awards in 1993 and 1998.

The Town completed a 2.3 million dollar major upgrade to the POTW in 2001. The upgrade includes improvements to the influent lift station, two grit collection channels, a Parshall flume, an influent barscreen, increased aeration for the oxidation ditch, a new secondary clarifier with return activated sludge pumping capabilities, an aerobic sludge digester, a rotary drum sludge thickener, and ultraviolet (UV) disinfection.

Permit limitations and monitoring requirements for this permit period will remain essentially unchanged from the previous permit. The only exception will be the removal of the chlorine limit and monitoring requirement due to the UV disinfection system coming on line. Also due to increased design capacity, the mass limits have been increased.

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INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System of permits (NPDES permits), which is administered by the Environmental Protection Agency (EPA). The EPA has authorized the State of Washington to administer the NPDES permit program. Chapter 90.48 RCW defines the Department of Ecology's authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the State include procedures for issuing permits (Chapter 173-220 WAC), technical criteria for discharges from municipal wastewater treatment facilities (Chapter 173-221 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the state is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-220-060) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least thirty days before the permit is issued (WAC 173-220-050). The fact sheet and draft permit are available for review (see Appendix A--Public Involvement of the fact sheet for more detail on the Public Notice procedures).

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in this review have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised. Comments and the resultant changes to the permit will be summarized in Appendix D--Response to Comments.

GENERAL INFORMATION	
Applicant	Town of Twisp
Facility Name and Address	Town of Twisp Wastewater Treatment Facility Southeast end of Riverside Avenue Twisp, Washington 98856
Type of Treatment:	Class 2, Oxidation Ditch Activated Sludge System
Discharge Location	Methow River, River Mile: 38.9 Latitude: 48° 21' 19" N Longitude: 120° 06' 19" W
Water Body ID Number	WA-48-1020 (Old System) & EO28MQ (New System)

BACKGROUND INFORMATION

DESCRIPTION OF THE FACILITY

History

The Town is located in western Okanogan County along State Highway 20 in the central Methow Valley and approximately 30 miles west of the City of Okanogan. The area is principally residential with tourism and timber activities.

The Town's Publicly-Owned Treatment Works (POTW) was originally constructed and placed into operation in 1976. Prior to that date, the Town disposed of its sanitary sewage through individual septic tanks, drainage fields and dry wells. Until 2002 the facility had never been upgraded and, as a consequence, had passed its original 20-year expected design lifetime. The Town completed a 2.3 million dollar major upgrade to the POTW during the previous permit cycle. The upgrade includes improvements to the influent lift station, two grit collection channels, a Parshall flume, an influent barscreen, increased aeration for the oxidation ditch, a new secondary clarifier with return activated sludge pumping capabilities, an aerobic sludge digester, a rotary drum sludge thickener, and ultraviolet (UV) disinfection.

Collection System Status

The Town's collection system was originally installed during the summer of 1976 and now contains approximately 9.5 miles of 8-, 10- and 12-inch concrete gravity piping, three lift stations and one siphon. Very high infiltration rates (119,000 gpd equaling up to 70% of the

existing POTW design flow) had traditionally been received during the summer, especially during the month of June. Following a loss of solids incident in 1999 a video inspection of the sewer line was conducted. The inspection revealed a number of breaks and holes in the main line, which have been repaired as part of the upgrade. The Town had also instituted a program to raise manhole covers to the surface beginning in 1999. The Town expects to complete this project in 2004. Additionally in 1998, the Town began an ongoing program to clean and repair existing sewer lines which had become clogged with roots and/or debris.

Treatment Processes

The existing POTW is an activated sludge, extended aeration, oxidation ditch design, which provides secondary treatment for the Town's wastewater. The POTW is classified as a Class 2 facility due to its component parts and complexity of operations.

The principal treatment plant operator must be certified by the State as, at least, a Class II wastewater treatment plant operator.

Effluent Disinfection and Flow Measurement

A new UV disinfection system has been installed next to the existing chlorine contact chamber. It is a low pressure “in channel” system comprised of one concrete channel with two banks of lamps contained within the channel. The UV banks consist of modules located on one side of the channel, providing space for the installation of two additional modules per bank. Each UV bank presently contains 5 modules, each with four lamps for of total of forty lamps. A stainless steel baffle is located in the void space allowing for future expansion from 0.5 MGD to 0.7 MGD.

Only one bank of UV lamps will be required to disinfect the projected peak flow. However, two banks, each with separate electrical systems, are provided for redundancy.

Effluent flow measurement is provided using a 3-inch Parshall Flume and ultrasonic level sensor constructed as part of the new UV disinfection structure. The effluent composite sampler will be flow paced from this flow meter.

Discharge Outfall

Secondary treated and disinfected effluent is discharged from the facility via a 12-inch diameter outfall line which extends into the Methow River at River Mile 38.9 and terminates in a 16-foot long, 10-inch diameter diffuser. Because little was known about the condition of the diffuser, the previous permit required an inspection to be completed and a report submitted to the Department by May 1, 1998. The outfall diffuser is located approximately 50 feet from shore of the 115-foot wide river (at 7Q10 low flow conditions).

Residual Solids

The treatment facilities remove solids during the treatment of the wastewater at the headworks (grit) and in the oxidation ditch (scum), in addition to incidental solids (rags and other debris) removed as part of the routine maintenance of the equipment. Grit, rags, scum and screenings are drained and disposed of as solid waste at the local landfill.

The Town holds a Washington State Biosolids Disposal Permit number BA0023370. Biosolids disposal consists of land application in dilute liquid form to a biosolids disposal site permitted by the Department.

PERMIT STATUS

The previous permit for this facility was issued on February 22, 1999, which placed the effluent limitations on BOD, TSS, pH, Fecal Coliform and Residual Chlorine.

An application for permit renewal was submitted to the Department on December 12, 2003 and accepted by the Department on December 29, 2003.

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

The facility received its last inspection on August 3, 2003. The plant appears to be operating in good order.

During the history of the previous permit, the Permittee has remained in substantial compliance, based on Discharge Monitoring Reports (DMRs) submitted to the Department and inspections conducted by the Department.

The Permittee has failed to submit ammonia data on a quarterly basis. The Permittee is required to monitor ammonia, alkalinity and hardness on a monthly basis during this permit term to establish a data base to assure compliance with water quality standards.

WASTEWATER CHARACTERIZATION

The concentration of pollutants in the influent was reported in DMRs submitted to the Department as a requirement of the previous permit. During the 24-month period following completion of the upgrade from October 2001 through October 2003, the influent is characterized and compared to previous permit approved final design criteria for the existing wastewater treatment facilities as follows in Table 2:

Table 2: Influent Characterization Compared to POTW Design Criteria

Parameter	Units	Cumulative Average [1]		Maximum Average Monthly.	
		Current Value October 2001-03	% of Design	Current Value [2] October 2001-03	% of Design
BOD_5	lb./Day	99.4	33.1	248.9 [3]	82.9
Flow	MGD	0.09	55.2	0.109	66.8
pH	Std. Units	7.5 - 6.8	NA	NA	NA
Temperature	°C	12	NA	19	NA
TSS	lb/Day	135.9	45.3	287.6 [4]	95.9

[1] Cumulative Average Values are based on a two year period from October 2001 to October 2003.
[2] Maximum Monthly Averages are based on a two year period from October 2001 to October 2003.
[3] Highest values occurred September 2003.
[4] Highest value occurred in June 2002.

From the available data, the Department has determined that the Town has not exceeded 85% of any of its design criteria. In proposed permit Condition S4.B., the Town will be required to submit to the Department a Plan for Maintaining Adequate Capacity (PMAC) whenever 85% of any one or more design criteria have been exceeded for three or more consecutive months.

Effluent

The concentration of pollutants in the effluent was reported in DMRs submitted to the Department as a requirement of the previous permit. During the 24-month period from October 2001 through October 2003, the effluent is characterized and compared to the previous permit's limits as follows in Table 3:

Table 3: Effluent Characterization Compared to Permit Limits

Parameter	Units	2 Year Cumulative Monthly Average		Average Monthly Maximum/Minimum		
		Current Value	% of Permit Limit	Current Value		% of Permit Limit
BOD_5	mg/L	12.8	43	Max 13.6	Min 2.9	45 (max)
BOD_5 % Removal	%	96	NA	Max 98.6	Min 92.7	NA
DO	mg/L	5.2	NA	Max 6.6	Min 4	NA
Fecal Coliform Bacteria	# colonies per 100 ml	7	3.5	Max 15.2	Min 1.0	7.6 (max)
pH	Std. Units	NA	NA	Max 8.4	Min 2.3	NA
TSS	mg/L	4	13	Max 10.8	Min 1.8	36 (max)
TSS % Removal	%	97.9	NA	Max 99	Min 96.4	NA

SEPA COMPLIANCE

All requirements for SEPA compliance have been fulfilled by the Town.

PROPOSED PERMIT LIMITATIONS

Federal and State regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations for municipal discharges are set by regulation (40 CFR 133, and Chapters 173-220 and 173-221 WAC). Water quality-based limitations are based upon compliance with the Surface Water Quality Standards

(Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC), Sediment Quality Standards (Chapter 173-204 WAC) or the National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992.) The most stringent of these types of limits must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

The limits in this permit are based in part on information received in the application. The effluent constituents in the application were evaluated on a technology- and water quality-basis. The limits necessary to meet the rules and regulations of the State of Washington were determined and included in this permit. Ecology does not develop effluent limits for all pollutants that may be reported on the application as present in the effluent**.** Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation**.** Effluent limits are not always developed for pollutants that may be in the discharge but not reported as present in the application. In those circumstances the permit does not authorize discharge of the non-reported pollutants. Effluent discharge conditions may change from the conditions reported in the permit application. If significant changes occur in any constituent, as described in 40 CFR 122.42(a), the Permittee is required to notify the Department of Ecology. The Permittee may be in violation of the permit until the permit is modified to reflect additional discharge of pollutants.

DESIGN CRITERIA

In accordance with WAC 173-220-150 (1)(g), flows or waste loadings shall not exceed approved design criteria.

The design criteria for this treatment facility are taken from Predesign Report Amendment to Facilities Plan and Wastewater Treatment Plant Improvements, November 1998 engineering report prepared by Gray & Osborne, Inc. and are as follows in Table 4:

Table 4: Design Standards for Town of Twisp WWTP

Parameter	Design Quantity
Average Monthly Flow	0.163 MGD
Maximum Monthly Flow	0.182 MGD
Instantaneous Peak Flow	0.500 MGD
BOD_5 influent loading Max. Month	300 lb./day
BOD_5 influent loading Ave. Annual	220 lb./day
TSS influent loading Max. Month	300 lb./day
TSS influent loading Ave. Annual	220 lb./day
Design population equivalent	1,456 (design year 2021)

Residual Chlorine has been included in the design criteria; however, due to the installation of the new UV system, limits for and monitoring of chlorine are not required in this permit.

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

Municipal wastewater treatment plants are a category of discharger for which technology-based effluent limits have been promulgated by federal and state regulations. These effluent limitations are given in the Code of Federal Regulations (CFR) 40 CFR Part 133 (federal) and in Chapter 173-221 WAC (state). These regulations are performance standards that constitute all known available and reasonable methods of prevention, control, and treatment for municipal wastewater.

The following technology-based limits for pH, fecal coliform, BOD_5, and TSS are taken from Chapter 173-221 WAC are contained in Table 7:

Table 7: Technology-based Limits

Parameter	Limit
pH:	Shall be within the range of 6 to 9 standard units.
Fecal Coliform Bacteria:	Monthly Geometric Mean = 200 organisms/100 mL Weekly Geometric Mean = 400 organisms/100 mL
BOD_5 (concentration):	Average Monthly Limit (mg/L) is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit (mg/L) = 45 mg/L
BOD_5 (mass):	Average Monthly Limit (lb./day) was calculated as the maximum monthly design flow (0.182 MGD) x Average Monthly concentration limit (30 mg/L) x 8.34 (conversion factor) = 45.5 lb./day. Average Weekly Limit (lb./day) is calculated as 1.5 x monthly loading = 68.25 lbs/day
TSS (concentration):	Average Monthly Limit (mg/L) is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit (mg/L) = 45 mg/L
TSS (mass):	Average Monthly Limit (lb./day) was calculated as the maximum monthly design flow (0.182 MGD) x average monthly concentration limit (30 mg/L) x 8.34 (conversion factor) = 45.5 lb./day. Average Weekly Limit (lb./day) is calculated as 1.5 x monthly loading = 68.25 lbs/day

SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the state. Water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin-wide total maximum daily loading study (TMDL).

Numerical Criteria for the Protection of Aquatic Life

"Numerical" water quality criteria are numerical values set forth in the State of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the Water Quality Standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

Numerical Criteria for the Protection of Human Health

The state was issued 91 numeric water quality criteria for the protection of human health by the U.S. EPA (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

Narrative Criteria

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the State of Washington.

Antidegradation

The State of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when receiving waters are of

higher quality than the criteria assigned, the existing water quality shall be protected. More information on the State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

The Department has reviewed existing records and is unable to determine if ambient water quality is either higher or lower than the designated classification criteria given in Chapter 173-201A WAC; therefore, the Department will use the designated classification criteria for this water body in the proposed permit. The discharges authorized by this proposed permit should not cause a loss of beneficial uses.

Critical Conditions

Surface water quality-based limits are derived for the waterbody's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses.

Mixing Zones

The Water Quality Standards allow the Department of Ecology to authorize mixing zones around a point of discharge in establishing surface water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment near the point of discharge. The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving all known, available, and reasonable methods of prevention, control and treatment (AKART) and in accordance with other mixing zone requirements of WAC 173-201A-100.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria.

Description of the Receiving Water

The facility discharges to the Methow River at River Mile 38.9 which is designated as a Class A receiving water in the vicinity of the outfall. Other nearby point source outfalls include the Town of Winthrop Wastewater Treatment Plant that is located approximately 11 miles up the Methow River.

Water quality of this class shall meet or exceed the requirements for all or substantially all of the following characteristic uses: water supply (domestic, industrial, agricultural); stock watering; fish migration; fish rearing, spawning and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation.

The 51st river mile section of the Methow River, east of Winthrop, located in Township 34 N, Range 21 E, Section 3, W.M. is 303d listed for Instream Flow and Temperature. The Department is addressing the instream flow issue by reassigning selected irrigation users to draw from wells rather than directly from the river. In the last three years over 200 users have switched from directly drawing from the river to irrigation wells. To date a TMDL for temperature has not been established and it is unlikely that one will be approved by the end of this permit period.

Surface Water Quality Criteria

Applicable criteria are defined in Chapter 173-201A WAC for aquatic biota. In addition, U.S. EPA has promulgated human health criteria for toxic pollutants (EPA 1992). Criteria for this discharge are summarized below:

Fecal Coliforms	100 organisms/100 mL maximum geometric mean
Dissolved Oxygen	8 mg/L minimum
Temperature	18 degrees Celsius maximum or incremental increases above background
pH	6.5 to 8.5 standard units
Turbidity	less than 5 NTUs above background
Toxics	No toxics in toxic amounts (see Appendix C for numeric criteria for toxics of concern for this discharge)

CONSIDERATION OF SURFACE WATER QUALITY-BASED LIMITS FOR NUMERIC CRITERIA

Pollutant concentrations in the proposed discharge exceed water quality criteria with technology-based controls which the Department has determined to be AKART. A mixing zone is authorized in accordance with the geometric configuration, flow restriction, and other restrictions for mixing zones in Chapter 173-201A WAC and are defined as follows:

> "The length of the chronic mixing zone shall extend downstream no greater than 130 feet and upstream for no greater than 100 feet. The width of the chronic mixing zone shall not be more than 28.8 feet."

The length of the chronic mixing zone was determined to be less than the maximum 303 feet allowable, because the respective mixing zone width at the maximum length would exceed the Department's regulated limit of 25% of the river width. Instead, the respective mixing zone length corresponding to the limited river width of 28.8 feet was determined to be approximately 130 feet. The dilution factors of effluent to receiving water that occur within the chronic and acute mixing zones are also limited by 25% and 2.5% of the receiving water flow, respectively, and are therefore less than the dilution factors identified in the Town's October, 1997 Wastewater Facilities Plan. The Department has determined through RIVPLUME5, computer modeling, that the following dilution factors are applicable at the critical condition:

Acute	Chronic
13.8	62.2

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field pollutants whose adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as BOD is a far-field pollutant whose adverse effects occur away from the discharge even after dilution has occurred. Thus, the method of calculating water quality-based effluent limits varies with the point at which the pollutant has its maximum effect. The derivation of water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water.

The critical condition for the Methow River as determined by the Department's Environmental Assessment Program is the seven day average low river flow over fifty years with a recurrence interval of ten years (7Q10). Ambient data at critical conditions in the vicinity of the Town's outfall were taken from historical data from 1991 to 2003 are as follows:

Critical Condition Parameters

Parameter	Critical Condition Value
Alkalinity:	100 mg/L as $CaCO_3$
Depth:	3.5 feet
DO:	9.5 mg/L
7Q10 Flow:	150 cfs
Hardness:	75 mg/L as $CaCO_3$
pH:	8.5 Standard Units
Temperature:	18.5 ºC
Velocity:	1.38 ft/sec

BOD_5 -- This discharge with technology-based limitations results in a small amount of BOD loading relative to the large amount of dilution occurring in the receiving water at critical conditions. Technology-based limitations will be protective of dissolved oxygen criteria in the receiving water and were placed into the proposed permit.

Temperature

WAC 173-201A-130(21) establishes a temperature criteria of 18.0°C for this Class A segment of the Methow River and details 2 tests to demonstrate compliance. The regulation states: When natural conditions exceed 18.0°C, no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3°C; nor shall such temperature increases, at any

time, exceed t = 28/(T+7). The point of compliance for temperature is at the edge of the chronic mixing zone.

1. *No temperature increase . . . greater than 0.3°C*

   Utilizing a simple mass balance calculation, and assuming a chronic dilution factor of 62, an effluent temperature of 20°C, and the 95th percentile ambient temperature of 16.6°C, the calculated temperature at the edge of the mixing zone is 16.66°C. The net temperature rise is 0.055°C, which is significantly less than the allowable 0.3°C. The effluent temperature used was the Highest Monthly Average value observed during the last 3 summers. The ambient temperature value used is the average of the highest values reported from 1991 to 2003.

2. *Temperature increase shall not exceed t = 28/(T+7)*

   t = 28/(16.6 + 7)
   t = 1.89°C
   0.055°C<1.89°C

Therefore, the temperature effluent limit has been dropped from the permit.

pH -- The impact of pH was modeled using the calculations from EPA, 1988. The input variables were a dilution factor 62, an upstream temperature of 18.5^{o}C, an upstream pH of 8.5, an upstream alkalinity of 100 mg/L as $CaCO_3$, an effluent temperature of 18^{o}C, an effluent pH of 6, an effluent pH of 9, and an estimated effluent alkalinity of 50 mg/L as $CaCO_3$.

Fecal coliform bacteria -- The numbers of fecal coliform were modeled by simple mixing analysis using the technology-based limit of 200 organisms per 100 ml and a dilution factor of 62. Under critical conditions there is no predicted violation of the Water Quality Standards for Surface Waters with the technology-based limit. Therefore, the technology-based effluent limitation for fecal coliform bacteria was placed into the proposed permit.

Toxic Pollutants -- Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria of the receiving water. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the Water Quality Standards for Surface Waters or from having surface water quality-based effluent limits.

Ammonia was determined to be the only toxic present in the POTW discharge and a determination of the reasonable potential for this toxic to exceed the water quality criteria was evaluated with procedures given in EPA, 1991 at the critical condition, which in this case

typically occurs during late summer. However, the Department determined that there was no reasonable potential for ammonia to cause a violation of Water Quality Standards. The determination assumes that the Permittee meets all of the other effluent limits of the proposed permit. The Permit will require the Permittee to monitor ammonia, alkalinity and hardness on a monthly basis for this permit term in order to develop a data base for future determinations.

Whole Effluent Toxicity

The Water Quality Standards for Surface Waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing.

The only toxic in the effluent has been determined to be ammonia, which a Reasonable Potential Determination which indicates a violation of water quality standards for ammonia is unlikely. The recently completed upgrade to the POTW included improvements to the oxidation ditch, which is highly effective in ammonia removal and denitrification.

Toxicity caused by unidentified pollutants is not expected in the effluent from this discharge as determined by the screening criteria given in Chapter 173-205 WAC. Therefore, no WET testing is required in the proposed permit. The Department may require WET testing in the future if it receives information that toxicity may be present in the Town's effluent.

Human Health

The State's water quality standards now include 91 numeric health-based criteria that must be considered in NPDES permits. These criteria were promulgated for the State by the EPA in its National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992).

The Permittee lists no Significant Industrial Users serviced by the POTW, therefore no human health toxics are expected to be present in the effluent.

Sediment Quality

The Department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that the Department may require municipalities to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400). The Department has determined through a review of the discharger characteristics and effluent characteristics that this discharge is unlikely to violate the Sediment Management Standards due to the lack of any Significant Industrial Users.

GROUND WATER QUALITY LIMITATIONS

The Department has promulgated Ground Water Quality Standards (Chapter 173-200 WAC) to protect uses of ground water. Permits issued by the Department shall be conditioned in such a manner so as not to allow violations of those standards (WAC 173-200-100). The Town has no discharge to ground; therefore, no limitations are required based on potential effects to ground water.

COMPARISON OF PROPOSED EFFLUENT LIMITS WITH THE PREVIOUS PERMIT

The final effluent limitations contained in the previous permit began on January 1, 2002 for the Town's treated wastewater discharges to the Methow River are contained in Table 5 below:

Table 5: Previous Permit Final Effluent Limitations

Effluent Limitations: #001				
Parameter	**Units**	**Average Monthly**	**Average Weekly**	**Maximum Daily**
BOD_5	mg/L; lb./day	30; 37.3	45; 56.0	N/A
Fecal Coliform Bacteria	# colonies/100 ml	200	400	N/A
Total Residual Chlorine*	mg/L; lb./day	0.09; 0.11	N/A	0.23; 0.29
TSS	mg/L; lb./day	30; 37.3	45; 56.0	N/A
Parameter	**Daily Discharge Value**			
pH	Shall not be outside the range of 6.0 to 9.0.			

* The Total Residual Chlorine effluent limits shall be null and void only when the Town has completed the installation of the UV disinfection system.

The proposed permit limitations are contained in Table 6 below:

Table 6: Proposed Permit's Effluent Limitations

Effluent Limitations: #001				
Parameter	**Units**	**Average Monthly**	**Average Weekly**	**Maximum Daily**
BOD_5	mg/L; lb./day	30; 45.5	45; 68.25	N/A
Fecal Coliform Bacteria	# colonies/100 ml	200	400	N/A
TSS	mg/L; lb./day	30; 45.5	45; 68.25	N/A
Parameter	**Daily Discharge Value**			
pH	Shall not be outside the range of 6.0 to 9.0.			

Note that the concentration limits for BOD and TSS have remained the same. Only the mass-loading limits increased due to the revised flow design criteria following upgrade of the POTW.

MONITORING REQUIREMENTS

Monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved.

The monitoring schedule is detailed in the proposed permit under Condition S2. Specified monitoring frequencies take into account the quantity and variability of discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of the Department's *Permit Writer's Manual* (July 1994) for an activated sludge oxidation ditch treatment facility.

LAB ACCREDITATION

With the exception of certain parameters, the proposed permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories.* The laboratory at this facility is accredited for BOD, DO, pH, TSS and Fecal Coliform Counts.

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

The conditions of S3. are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-220-210).

PREVENTION OF FACILITY OVERLOADING

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-220-150 require the Permittee to take the actions detailed in proposed permit requirement S4. to plan expansions or modifications before existing capacity is reached and to report and correct conditions that could result in new or increased discharges of pollutants. Condition S4. restricts the amount of flow.

OPERATION AND MAINTENANCE (O&M)

The proposed permit contains condition S.5. as authorized under RCW 90.48.110, WAC 173-220-150, Chapter 173-230 WAC, and WAC 173-240-080. It is included to ensure proper

operation and regular maintenance of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

RESIDUAL SOLIDS HANDLING

To prevent water quality problems the Town is required in proposed permit Condition S7. to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and State Water Quality Standards.

The final use and disposal of sewage sludge from the Town's POTW is regulated by EPA under 40 CFR Part 503 and by the State under Chapter 173-35008 WAC. The disposal of other solid waste is under the jurisdiction of the Okanogan County Health Department. The proposed permit requires the submission of a Residual Solids Management Plan.

WASTEWATER PERMIT REQUIRED

RCW 90.48 and WAC 173-216-040 require SIUs to obtain a permit prior to discharge of industrial waste to the Permittee's sewerage system. This provision prohibits the POTW from accepting industrial wastewater from any such dischargers without authorization from the Department.

DUTY TO ENFORCE DISCHARGE PROHIBITIONS

This provision prohibits the POTW from authorizing or permitting an industrial discharger to discharge certain types of waste into the sanitary sewer. The first portion of the provision prohibits acceptance of pollutants which cause pass through or interference. The definitions of pass through and interference are in Appendix B of the fact sheet.

The second portion of this provision prohibits the POTW from accepting certain specific types of wastes, namely those which are explosive, flammable, excessively acidic, basic, otherwise corrosive, or obstructive to the system. In addition wastes with excessive BOD, petroleum based oils, or which result in toxic gases are prohibited to be discharged. The regulatory basis for these prohibitions is 40 CFR Part 403, with the exception of the pH provisions which are based on WAC 173-216-060.

The third portion of this provision prohibits certain types of discharges unless the POTW receives prior authorization from the Department. The discharges include cooling water in significant volumes, stormwater and other direct inflow sources, and wastewaters significantly affecting system hydraulic loading, which do not require treatment.

GENERAL CONDITIONS

General Conditions are based directly on state and federal law and regulations and have been standardized for all individual municipal NPDES permits issued by the Department.

PERMIT ISSUANCE PROCEDURES

PERMIT MODIFICATIONS

The Department may modify this permit to impose numerical limitations, if necessary to meet Water Quality Standards, Sediment Quality Standards, or Ground Water Standards, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify this permit as a result of new or amended state or federal regulations.

RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to protect human health, aquatic life, and the beneficial uses of waters of the State of Washington. The Department proposes that this permit be issued for 5 years.

REFERENCES FOR TEXT AND APPENDICES

Environmental Protection Agency (EPA)

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.

1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington, D.C.

1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

1983. Water Quality Standards Handbook. USEPA Office of Water, Washington, D.C.

Metcalf and Eddy.

1991. Wastewater Engineering, Treatment, Disposal, and Reuse. Third Edition.

Tsivoglou, E.C., and J.R. Wallace.

1972. Characterization of Stream Reaeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Washington State Department of Ecology.

Laws and Regulations(http://www.ecy.wa.gov/laws-rules/index.html)

Permit and Wastewater Related Information (http://www.ecy.wa.gov/programs/wq/wastewater/index.html

Washington State Department of Ecology.

1994. Permit Writer's Manual. Publication Number 92-109

Water Pollution Control Federation.

1976. Chlorination of Wastewater.

Wright, R.M., and A.J. McDonnell.

1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(EE2). (Cited in EPA 1985 op.cit.)

APPENDIX A -- PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on July 16, 2003 in the Wenatchee World to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

The Department will publish a Public Notice of Draft (PNOD) on March 31, 2004 in the Methow Valley News to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Water Quality Permit Coordinator
Department of Ecology
Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, WA 98902

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the thirty (30) day comment period to the address above. The request for a hearing shall indicate the interest of the party and the reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-220-090). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

The Department will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, 509/457-7105, or by writing to the address listed above.

This permit and fact sheet were written by Richard A. Marcley.

APPENDIX B -- GLOSSARY

Acute Toxicity--The lethal effect of a pollutant on an organism that occurs within a short period of time, usually 48 to 96 hours.

AKART-- An acronym for "all known, available, and reasonable methods of prevention, control, and treatment".

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Average Monthly Discharge Limitation --The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month (except in the case of fecal coliform). The daily discharge is calculated as the average measurement of the pollutant over the day.

Average Weekly Discharge Limitation -- The highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week. The daily discharge is calculated as the average measurement of the pollutant over the day.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of a treatment facility.

CBOD5 – The quantity of oxygen utilized by a mixed population of microorganisms acting on the nutrients in the sample in an aerobic oxidation for five days at a controlled temperature of 20 degrees Celsius, with an inhibitory agent added to prevent the oxidation of nitrogen compounds. The method for determining CBOD5 is given in 40 CFR Part 136.

Chlorine--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity--The effect of a pollutant on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA)--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Combined Sewer Overflow (CSO)--The event during which excess combined sewage flow caused by inflow is discharged from a combined sewer, rather than conveyed to the sewage treatment plant because either the capacity of the treatment plant or the combined sewer is exceeded.

Compliance Inspection - Without Sampling--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance Inspection - With Sampling--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the percent removal requirement. Additional sampling may be conducted.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing a minimum of four discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Continuous Monitoring –Uninterrupted, unless otherwise noted in the permit.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Dilution Factor--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the effluent fraction e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Engineering Report--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

Industrial User-- A discharger of wastewater to the sanitary sewer which is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Infiltration and Inflow (I/I)--"Infiltration" means the addition of ground water into a sewer through joints, the sewer pipe material, cracks, and other defects. "Inflow" means the addition of precipitation-caused drainage from roof drains, yard drains, basement drains, street catch basins, etc., into a sewer.

Interference -- A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:
Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal and;
Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 507, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Major Facility--A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum Daily Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Method Detection Level (MDL)--The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

Minor Facility--A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing Zone--A volume that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in State regulations (Chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both State and Federal laws.

Pass through -- A discharge which exits the POTW into waters of the-State in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation), or which is a cause of a violation of State water quality standards.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Potential Significant Industrial User--A potential significant industrial user is defined as an Industrial User which does not meet the criteria for a Significant Industrial User, but which discharges wastewater meeting one or more of the following criteria:

a. Exceeds 0.5 % of treatment plant design capacity criteria and discharges <25,000 gallons per day or;

b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).

The Department may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

Quantitation Level (QL)-- A calculated value five times the MDL (method detection level).

Significant Industrial User (SIU)--

1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N and;
2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

   Upon finding that the industrial user meeting the criteria in paragraph 2, above, has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority* may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

*The term "Control Authority" refers to the Washington State Department of Ecology in the case of non-delegated POTWs or to the POTW in the case of delegated POTWs.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, wetlands, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)--Total suspended solids are the particulate materials in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Upset--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit--A limit on the concentration or mass of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

APPENDIX C -- TECHNICAL CALCULATIONS

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on the Department's homepage at (http://www.ecy.wa.gov/programs/wq/wastewater/index.html

DILUTON FACTOR CALCULATUION

Spread of a plume from a point source in a river with boundary effects from the shoreline based on the method of Fischer *et al.* (1979) with correction for the effective origin of effluent.
METHOW RIVER @ TWISP 7Q10 150 CFS
Revised 22-Feb-96

INPUT	CHRONIC	ACUTE
1. Effluent Discharge Rate (cfs):	0.16	0.22
2. Receiving Water Characteristics Downstream From Waste Input		
Stream Depth (ft):	1.00	1.00
Stream Velocity (fps):	0.56	0.56
Channel Width (ft):	68.00	68.00
Stream Slope (ft/ft) or Manning roughness "n":	0.035	0.035
0 if slope or 1 if Manning "n" in previous cell:	1	1
3. Discharge Distance From Nearest Shoreline (ft):	42	42
4. Location of Point of Interest to Estimate Dilution		
Distance Downstream to Point of Interest (ft):	300	30
Distance From Nearest Shoreline (ft):	42	42
5. Transverse Mixing Coefficient Constant (usually 0.6):	0.6	0.6
6. Original Fischer Method (enter 0) or *Effective Origin* Modification (enter 1)	1	1
OUTPUT		
1. Source Conservative Mass Input Rate		
Concentration of Conservative Substance (%):	100.00	100.00
Source Conservative Mass Input Rate (cfs*%):	15.50	22.20
2. Shear Velocity		
Shear Velocity based on slope (ft/sec):	#N/A	#N/A
Shear Velocity based on Manning "n":		
using Prasuhn equations 8-26 and 8-54 assuming		
hydraulic radius equals depth for wide channel		
Darcy-Weisbach friction factor "f":	0.142	0.142
Shear Velocity from Darcy-Weisbach "f" (ft/sec):	0.074	0.074
Selected Shear Velocity for next step (ft/sec):	0.074	0.074
3. Transverse Mixing Coefficient (ft2/sec):	0.044	0.044
4. Plume Characteristics Accounting for Shoreline Effect (Fischer *et al.*, 1979)		
Co	4.11E-01	5.88E-01
x'	5.19E-03	5.22E-04
y'o	6.18E-01	6.18E-01
y' at point of interest	6.18E-01	6.18E-01
Solution using superposition equation (Fischer eqn 5.9)		

Term for n= -2	0.00E+00	0.00E+00
Term for n= -1	2.10E-84	0.00E+00
Term for n= 0	1.00E+00	1.00E+00
Term for n= 1	5.85E-13	1.92E-122
Term for n= 2	1.26E-160	0.00E+00
Upstream Distance from Outfall to *Effective Origin* of Effluent Source (ft)	0.08	0.16
Effective Distance Downstream from Effluent to Point of Interest (ft)	300.08	30.16
x' Adjusted for *Effective Origin*	5.19E-03	5.22E-04
C/Co (dimensionless)	3.92E+00	1.24E+01
Concentration at Point of Interest (Fischer Eqn 5.9)	1.61E+00	7.27E+00
Unbounded Plume Width at Point of Interest (ft)	27.712	8.785
Unbounded Plume half-width (ft)	13.856	4.393
Distance from near shore to discharge point (ft)	42.00	42.00
Distance from far shore to discharge point (ft)	26.00	26.00
Plume width bounded by shoreline (ft)	27.71	8.79
Approximate Downstream Distance to Complete Mix (ft):	3,381	3,381
Theoretical Dilution Factor at Complete Mix:	243.484	170.000
Calculated Flux-Average Dilution Factor Across Entire Plume Width:	99.228	21.964
	CHRONIC	**ACUTE**
Calculated Dilution Factor at Point of Interest:	**62.182**	**13.764**

MASS BALANCE
CALCULATION OF DILUTION FACTORS

ACUTE DILUTION

eff flow	eff conc	rw flow	rw conc	**final conc**	**dil factor**
0.22	0	3.75	0	0.000	18.04545

CHRONIC DILUTION

eff flow	eff conc	rw flow	rw conc	**final conc**	**dil factor**
0.16	0	37.5	0	0.000	235.375

Freshwater un-ionized ammonia criteria based on EPA Gold Book
(EPA 440/5-86-001) as revised by Heber and Ballentine (1992).
Based on Lotus File NH3FRES2.WK1 Revised 12-Dec-94

INPUT	
1. Temperature (deg C; 0<T<30):	18.5
2. pH (6.5<pH<9.0):	8.50
3. Total Ammonia (ug N/L):	0.01
4. Acute TCAP (Salmonids present- 20; absent- 25):	20
5. Chronic TCAP (Salmonids present- 15; absent- 20):	15
OUTPUT	
1. Intermediate Calculations:	
Acute FT:	1.1092
Chronic FT:	1.4125
FPH:	1.0000
RATIO:	13.5000
pKa:	9.4488
Fraction Of Total Ammonia Present As Un-ionized:	10.1126%
2. Sample Un-ionized Ammonia Concentration (ug/L as NH3-N):	0.0
3. Un-ionized Ammonia Criteria:	
Acute (1-hour) Un-ionized Ammonia Criterion (ug/L as NH3-N):	192.7
Chronic (4-day) Un-ionized Ammonia Criterion (ug/L as NH3-N):	34.5
4. Total Ammonia Criteria:	
Acute Total Ammonia Criterion (ug/L as NH3-N):	1,905
Chronic Total Ammonia Criterion (ug/L as NH3-N):	341

Ammonia Reasonable Potential to Violate Water Quality Standards

This spreadsheet calculates the reasonable potential to exceed state water quality standards for a small number of samples. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality-based Toxics Control, U.S. EPA, March, 1991 (EPA/505/2-90-001) on page 56. User input columns are shown with red headings. Corrected formulas in col G and H on 5/98 (GB)

	State Water Quality Standard		Max concentration at edge of...		
	Acute	Chronic	Acute Mixing Zone	Chronic Mixing Zone	**LIMIT REQ'D?**
Parameter	*ug/L*	*ug/L*	*ug/L*	*ug/L*	
Ammonia	1900.	341.	66	14.6	**NO**

CALCULATIONS								
Effluent percentile value		Max effluent conc. measured (metals as total recoverable)	Coeff Variation		# of samps	Multi plier	Acute Dil'n Factor	Chronic Dil'n Factor
	Pn	*ug/L*	*CV*	*s*	*n*			
0.95	0.473	240.00	0.60	0.55	2	2.59	13.8	62.2

Temperature at Edge of Chronic Mixing Zone

CHRONIC DILUTION

Effluent flow	Effluent Temp	River flow	River Temp	**final Temp**	**dil factor**
0.22	20	13.4	16.7	16.655	61.90909

WADOE EAP Data	Highest Critical Ambient River Temp in Degrees Celsius	
	16.7	3-Aug
	14.1	2-Sep
	16.5	1-Aug
	15.2	Aug-00
	10.9	Aug-99
	16.6	Sep-98
	13.5	Aug-97
	15.4	Aug-96
	12.1	Sep-95
	14.4	Aug-93
	14.4	Sep-91

Statistical Data	
Mean	14.52727
STDV	1.855851
Minimum	10.9
Maximum	16.7
95th Percentile	16.7
90th Percentile	16.6

__WA.D.O.E. EAP Data

	pH Summer Values	Ammonia Summer Values µg/L
Sep-02	8.22	.01
Jul-01	8.24	.02
Aug-00	8.3	.014
Aug-99	8	.014
Aug-98	8.2	.01
Sep-97	8.2	.021
91/1996	8.5	.01
Aug-95	8.5	.031
Sep-93	8.3	.022
Sep-91	8.1	.01
	95th Percentile	8.5
	90th Percentile	8.5

Calculation of pH of a mixture of two flows. Based on the procedure in EPA's DESCON program (EPA, 1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington D.C.)

Based on Lotus File PHMIX2.WK1 Revised 19-Oct-93

Critical Conditions 7Q10 150 CFS

INPUT	Max	Min
1. DILUTION FACTOR AT MIXING ZONE BOUNDARY	62.200	62.200
1. UPSTREAM/BACKGROUND CHARACTERISTICS		
Temperature (deg C):	18.50	18.50
pH:	8.50	8.50
Alkalinity (mg CaCO3/L):	100.00	100.00
2. EFFLUENT CHARACTERISTICS		
Temperature (deg C):	20.00	20.00
pH:	9.0	6.00
Alkalinity (mg CaCO3/L):	50.00	50.00
OUTPUT		
1. IONIZATION CONSTANTS		
Upstream/Background pKa:	6.39	6.39
Effluent pKa:	6.38	6.38
2. IONIZATION FRACTIONS		
Upstream/Background Ionization Fraction:	0.99	0.99
Effluent Ionization Fraction:	0.99	0.29
3. TOTAL INORGANIC CARBON		
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	100.78	100.78
Effluent Total Inorganic Carbon (mg CaCO3/L):	50.48	170.50
4. CONDITIONS AT MIXING ZONE BOUNDARY		

Temperature (deg C):	18.52	18.52
Alkalinity (mg CaCO3/L):	99.20	99.20
Total Inorganic Carbon (mg CaCO3/L):	99.97	101.90
pKa:	6.39	6.39
pH at Mixing Zone Boundary:	8.50	7.96

CHRONIC DILUTION — FECAL COLIFORM 200 Colonies/100 ML

eff flow	eff conc	rw flow	rw conc	**final conc**	**dil factor**
0.16	200	9.8	0	3.213	62.25

APPENDIX D -- RESPONSE TO COMMENTS

No comments were received by the Department of Ecology.